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RULEMAKING ESTABLISHING ELECTRIC WEATHERIZATION STANDARDS	**§ § §**	**PUBLIC UTILITY COMMISSION OF TEXAS**

NEXTERA ENERGY RESOURCES, LLC'S COMMENTS TO COMMISSION STAFF'S DISCUSSION DRAFT

NextEra Energy Resources, LLC ("NextEra") submits these comments in response to the proposed discussion draft issued by the Staff ("Staff") of the Public Utility Commission of Texas ("Commission"). The draft rule implements weather emergency preparedness measures for generation entities and transmission service providers in the Electric Reliability Council of Texas ("ERCOT") power region, as required by Senate Bill 3, 87th Legislative Regular Session.

I. INTRODUCTION

NextEra and its affiliates comprise one of the largest electric power and energy infrastructure companies in North America and are leaders in the renewable energy industry. NextEra is the world's largest generator of renewable energy from the wind and sun, as well as a world leader in battery storage. On a consolidated basis, NextEra and its affiliates operate a diverse generation fleet – wind, solar, natural gas, and nuclear – with approximately 58,000 MW of total generating capacity across 36 states and 4 Canadian provinces. Given NextEra's diverse mix of fuel sources, multiple geographical locations, and significant experience in the renewable industry, NextEra believes it has a unique perspective that can assist the Commission as it develops weatherization standards to satisfy the weather emergency preparedness requirements of Texas Utilities Code § 35.0021(b).

It is important that the Texas electric market continues to attract sufficient investment in generation resources to meet Texas' ongoing growth in demand for electric power. It is therefore critical that weatherization standards are designed in such a way that existing generation and a

diverse generation stack are retained, while at the same time new investment is encouraged to grow rather than reduce Texas' reserve margins.

NextEra refers to and adopts by reference its previous comments filed in this docket (Interchange Nos. 23 and 27)[1] regarding manufacturers' limits on wind and solar technologies. NextEra continues to recommend that weatherization standards recognize the Original Equipment Manufacturer ("OEM") limits and available technologies and not require weatherization beyond what is commercially available.

II. EXECUTIVE SUMMARY

- Question 1: National Oceanic and Atmospheric Administration ("NOAA") provides the most comprehensive source of historical weather information.
- Question 2: There are existing market-based mechanisms for cost recovery for the wind, solar, and storage generation assets provided OEM standard design limits are followed. However, any requirement to retrofit existing generation beyond OEM standards should include cost recovery.
- 16 Texas Administrative Code ("TAC") § 25.55(b): A definition should be developed for "Applicable Rated Capability" that recognizes the weather susceptibility for renewable generation.

III. RESPONSE TO QUESTIONS

Question 1:

What is the availability of statistically reliable weather information from, e.g., the American Society of Heating, Refrigeration and Air Conditioning Engineers' National

[1] Initial Comments of NextEra Energy Resources, LLC (Jun. 23, 2021); Errata to NextEra Initial Comments (Jun.23, 2021).

Weather Service; or other sources for the ERCOT power region? Please share the source of that information.

The most comprehensive source of historical weather information comes from the NOAA's National Centers for Environmental Information ("NOAA NCEI") - namely from their Integrated Surface Database ("ISD"). NOAA NCEI's ISD is a global database that consists of hourly and synoptic surface observations compiled from numerous sources into a single common American Standard Code for Information Interchange format and common data model.

Question 2:

Do existing market-based mechanisms provide sufficient opportunity for cost recovery to meet the weather reliability standards proposed in the discussion draft? If not, what cost recovery mechanisms should be included in the proposed rule?

NextEra is answering this question with respect to wind, solar, and storage, which make up its generation fleet in Texas. Currently, there are existing market-based mechanisms that provide opportunity for cost recovery as long as standard design limits are respected.

Beyond the standard design limits, some OEMs provide expanded design limit options. Those options include the ability to function at colder or hotter temperatures (but not always both), software packages that allow the turbines to continue to operate at the onset of mild icing conditions, and the ability to angle solar panels to assist with snow removal. NextEra has provided Attachment A to these comments showing current weather-related design limits for renewables and storage facilities in both the standard and expanded design limit options. The Commission should note Attachment A is a high-level overview, but detailed weatherization requirements should recognize that some existing assets may have retrofit limitations.

Any weatherization requirements to retrofit existing generation beyond the standard design limits necessitate additional cost recovery mechanisms. It would be speculative to provide

proposals for a cost recovery mechanism at this point without knowing the specific weather reliability standards that would be included in the final rule. However, NextEra has made business and investment decisions based on existing requirements. If existing generation based on past investment is required to retrofit beyond standard design limits, cost recovery mechanisms would be needed to support the additional capital investment to comply with new standards. NextEra recommends the Commission consider if cost recovery mechanisms should be incorporated into the Commission's efforts around overall system reliability.

Any weatherization requirements beyond those that are available as either standard or expanded packages should not be considered because they are not technically feasible and not commercially available.

IV. 16 TAC § 25.55(B) DEFINITIONS

"Applicable rated capability" is not defined in the proposed rule, and it is not defined in 16 TAC § 25.5. A complete definition of this term is needed to be able to understand, apply, and implement the weather reliability standards contemplated in the rule. Under the rule, generators must commission a study that confirms compliance with "applicable rated capability." ERCOT must inspect resources to determine whether they comply with requirements for "applicable rated capability." And the Commission may impose an administrative penalty based on whether the generator has achieved "applicable rated capability" at various percentiles of extreme weather scenarios.

Although "applicable rated capability" is not defined in the Commission's rules, "net dependable capability" is defined under 16 TAC § 25.5(76) as "the maximum load in megawatts net of station use, which a generating unit or generating station can carry under specified conditions for a given period of time, without exceeding approved limits of temperature and stress." Generation entities are currently required to provide ERCOT with the net dependable capability

of generation resources and also output limitations on any generation resources that result from fuel or environmental restrictions.[2]

A definition for "applicable rated capability" similar to "net dependable capability" would prevent ambiguity in the proposed rule. For example, a windfarm with a nameplate capacity of 100 MW will on a long-term average basis generate generally between 35 and 45 percent of that nameplate capacity. However, depending on the weather conditions, including the temperature and wind speed, the actual number of MW generated could be either well above or well below long-term averages and not within control of the owner and operator of the windfarm. If the wind speed is low or too high, or if the temperature is too high or low, the wind turbines may derate or become non-operational. In that situation, the definition of "applicable rated capability" must account for the fact that the resource has reduced generation capability due to environmental conditions. The rated capability would be determined by the manufacturer, but the actual capability at that moment would be lower. Thus, the term "applicable rated capacity" needs to include scenarios where due to environmental conditions outside of the operator's control, generation capability is decreased. Unlike thermal generation facilities, renewable generation, must by definition be exposed to the elements to be able to generate electricity.[3]

For these reasons NextEra suggests that the definition for "applicable rated capability" include the following:

> For renewable generation, "applicable rated capability" is the ability to generate under ERCOT's weather scenarios, acknowledging the current wind speed, solar irradiance, and other environmental conditions that govern the actual production capability.

[2] 16 TAC § 25.505(e).
[3] Although less impacted by weather, thermal generation capability is also reduced in extreme temperatures.

Including this text in the definition will provide additional clarity to the rule and prevent ambiguity. Holding renewable generation to a reliability standard without considering the weather conditions will drive renewables out of the ERCOT market.

V. ADDITIONAL COMMENTS

At this time, NextEra is not filing additional comments. However, NextEra reserves the right to file additional comments as the rule is developed.

VI. CONCLUSION

NextEra appreciates the opportunity to provide comments to Staff's discussion draft. Texas has one of the largest renewable generation fleets in the country. Any rulemaking regarding generation should continue to support the use of renewable generation.

Respectfully submitted,

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ATTORNEYS FOR NEXTERA ENERGY RESOURCES

ATTACHMENT A

NextEra provides the following information to assist with the development of weatherization rules that include renewable generation.

I. TEMPERATURE LIMITS

Manufacturers of wind facilities provide high and low temperature limits that reflect not only what is safe for the equipment but also technically viable. These temperatures can be standard to a given manufacturer and model design rating or include additional capabilities in the case of hot or cold weather packages. Any weather event scenario that contemplates temperatures beyond the high or low possible design limits which are not commercially available or a standard practice should not be a requirement.

There are additional items to consider when implementing high and low temperature standards that are within possible design limits. For at least one wind turbine manufacturer, a cold weather or hot weather package cannot both be installed. If ERCOT's weather event scenarios include high and low temperatures that both exceed the standard design limits, the Commission will need to determine which is the priority.

Solar facilities are designed with hardware that operates at a wide temperature range that can withstand both extreme cold and hot weather events. The hardware can operate to -40°C, which is much lower than the lowest temperature ever seen in Texas, which suggests that the standard design of existing solar generation in Texas is sufficient to address weather event scenarios.

Storage assets can be affected by high temperatures when temperatures exceed 45° Celsius as inverters or HVAC systems may no longer operate efficiently. At the low end of the temperature range, storage asset operations are limited to -18°C primarily due to the ability of the HVAC

systems to operate at low temperatures. Any rule should not contemplate standards beyond these temperature limits as these are sufficient to address weather event scenarios.

A basic summary of NextEra's ERCOT generation assets and their OEM design limits in achieving rated capability at various temperature conditions is provided below.[4]

			Rated Capability in Fahrenheit	Rated Capability in Celsius
Wind	Manufacturer 1	Standard	5° to 104°	-15° to 40°
		Cold Weather	-22° to 104°	-30° to 40°
	Manufacturer 2	Standard	14° to 95°	-10° to 35°
		Cold Weather	-13° to 95°	-25° to 35°
		Hot Weather	14° to 104°	-10° to 40°
	Manufacturer 3	Standard	-4° to 95°	-20° to 35°
		Cold Weather	NA	NA
Solar			-40° to 122-140°	-40° to 50°-60°
Storage			0° to 113°	-18° to 45°

II. WIND SPEED LIMITS

Like temperature limits, turbines have a maximum wind speed under which they can safely operate, which are very similar for each manufacturer. Any weather event scenario that contemplates wind speeds beyond the high design limits which are not commercially available should not be a requirement.

Solar facilities are designed to withstand wind speeds up to 45 mph before generation is impacted. The actual generation impact at different wind speeds can be highly variable depending on the angle of the solar panels and the speed and direction of the wind. Solar facilities with trackers have more flexibility to change the direction of the panels to optimize generation under high wind speeds and alleviate potential damage to the panels from high winds.

A basic summary of NextEra's ERCOT generation asset OEM design ratings as it relates to high wind speed restrictions is provided below.[5]

[4] The rated capabilities are averages and may vary slightly from turbine to turbine.
[5] The wind speeds are averages and may vary slightly from turbine to turbine.

		High Wind Speed
Wind	Manufacturer 1	Turbines begin to shut down at 57 mph on average
	Manufacturer 2	Turbines begin to shut down at 56 mph on average
	Manufacturer 3	Turbines begin to shut down at 56 mph on average
Solar		Wind speeds at 45 mph start to impact generation
Storage		Designed to local building code standards

III. PRECIPITATION LIMITS

A. Flood

Precipitation impacts, such as flood or drought, are not generally part of the manufacturers' designs. However, NextEra's generation fleet is built to flood standards above 100-year flood elevation. Infrastructure such as foundation supports are also typically designed to an elevation above or equivalent to weather levels of a 100-year flood.

B. Precipitation

Solar arrays that utilize trackers can be angled to prevent snow from accumulating and to help any snow accumulation slide off the panels, thereby reducing the impact from snow. On cloudy and rainy days, solar panels continue to generate power, but their capability is reduced.

For wind turbines, managing derating or shutdown caused by snow, ice, or other freezing precipitation is not generally part of the standard manufacturers design. However, some manufacturers offer icing software systems that are designed to help wind turbines continue to operate during mild icing conditions.

GE and Siemens both offer icing software that is designed to allow the turbines to continue to operate at the onset of mild icing. NextEra's GE turbines in Texas contain this technology,

however it did not provide a material benefit during the February event due to the magnitude of the icing.

Systems that heat turbine blades for the prevention of icing (anti-icing) or the elimination of ice buildup after it has formed (de-icing) are not currently offered by wind turbine manufacturers in the United States as the technology does not exist for these turbines.

IV. CONCLUSION

Although other technologies are still being researched, they are not commercially available today. It is important that generators maintain their generation equipment consistent with the OEM design. Requiring operations or retrofits outside of the manufacturer's parameters or adopting unproven technology can reduce overall reliability.